

Quarterly Groundwater Monitoring Report

Third Quarter 2005

**City of Arcata Corporation Yard
Arcata, California
Case No. 1NHU767**

Prepared for:

The City of Arcata



Consulting Engineers & Geologists, Inc.

812 W. Wabash Avenue
Eureka, CA 95501-2138
707/441-8855

December 2005
000108.100



CONSULTING ENGINEERS & GEOLOGISTS, INC.

812 W. Wabash • Eureka, CA 95501-2138 • 707-441-8855 • Fax 707-441-8877 • info@shn-eureka.com

Reference: 000108.100

December 16, 2005

Mr. Kim Watson, Superintendent of Public Works
City of Arcata
736 F Street
Arcata, CA 95521

Subject: Quarterly Groundwater Monitoring Report, Third Quarter 2005, City of Arcata Corporation Yard, 600 South G Street, Arcata, California; Case No. 1NHU767

Dear Mr. Watson:

This report presents the results of the quarterly groundwater-monitoring event, the operation of the groundwater extraction system, and biopile monitoring at the City of Arcata, Department of Public Works Corporation Yard for the third quarter of 2005. This work was performed by SHN Consulting Engineers & Geologists, Inc. (SHN) in accordance with our service agreement with the City of Arcata. City of Arcata employees conducted the third quarter monitoring activities on, July 20, 2005.

SHN is requesting closure of the biopile.

If you have any questions, please call me at 707/441-8855.

Sincerely,

SHN Consulting Engineers & Geologists, Inc.

Mike Foget, P.E.
Project Engineer

MKF/ADM:lms

Attachment: Report

copy w/attach: Karen Diemer, City of Arcata

Ron Allen, RWQCB

Melissa Martel, HCDEH

Reference: 000108.100

Quarterly Groundwater Monitoring Report

Third Quarter 2005

City of Arcata Corporation Yard
600 South G Street
Arcata, California

Prepared for:

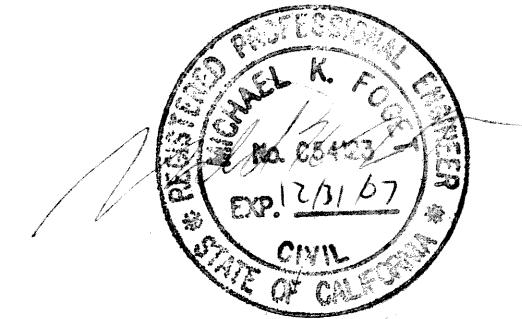
The City of Arcata

Prepared by:



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812 W. Wabash Avenue
Eureka, CA 95501-2138
707/441-8855

December 2005



QA/QC:MKF____

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Abbreviations and Acronyms

| | |
|-------|---|
| < | Denotes a value that is "less than" the method detection limit |
| ppm | parts per million |
| ug/g | micrograms per gram |
| ug/L | micrograms per Liter |
| BTEX | Benzene, Toluene, Ethylbenzene, and total Xylenes |
| DIPE | Diisopropyl Ether |
| EPA | (U. S.) Environmental Protection Agency |
| ETBE | Ethyl Tertiary-Butyl Ether |
| MSL | Mean Sea Level |
| MTBE | Methyl Tertiary-Butyl Ether |
| MW-# | Monitoring Well-# |
| RAIR | Remedial Action Implementation Report |
| RWQCB | California Regional Water Quality Control Board, North Coast Region |
| SHN | SHN Consulting Engineers & Geologists, Inc. |
| SP-# | Stockpile sample-number |
| TAME | Tertiary-Amyl Butyl Ether |
| TBA | Tertiary-Butyl Alcohol |
| TPHD | Total Petroleum Hydrocarbons as Diesel |
| TPHG | Total Petroleum Hydrocarbons as Gasoline |
| TPHMO | Total Petroleum Hydrocarbons as Motor Oil |
| VOC | Volatile Organic Compound |

1.0 Introduction

This report presents the results of groundwater monitoring activities and monthly biopile monitoring for the third quarter 2005, conducted at the City of Arcata Corporation Yard. Under the direction of SHN Consulting Engineers & Geologists, Inc. (SHN), the City of Arcata conducted the quarterly monitoring of 6 groundwater wells located at their corporation yard. The site is located on South G Street adjacent to Butcher's Slough and Arcata Bay. The corporation yard houses the City of Arcata's wastewater treatment plant and the Department of Public Works' vehicle maintenance and equipment storage facilities. The site lies within Section 32 of Township 5 North, Range 1 East, Humboldt Base and Meridian (Figure 1).

Third quarter 2005 monitoring activities are presented in 5 sections. This section serves as an introduction for the report. Section 2.0 describes the field program for the work conducted during this monitoring event. Section 3.0 includes a discussion of the results of the monitoring activities. Section 4.0 presents our conclusions and site recommendations. Section 5.0 includes references cited in this report.

The objective of this work was to assess groundwater conditions beneath the site over time.

2.0 Field Activities

2.1 Monitoring Well Sampling

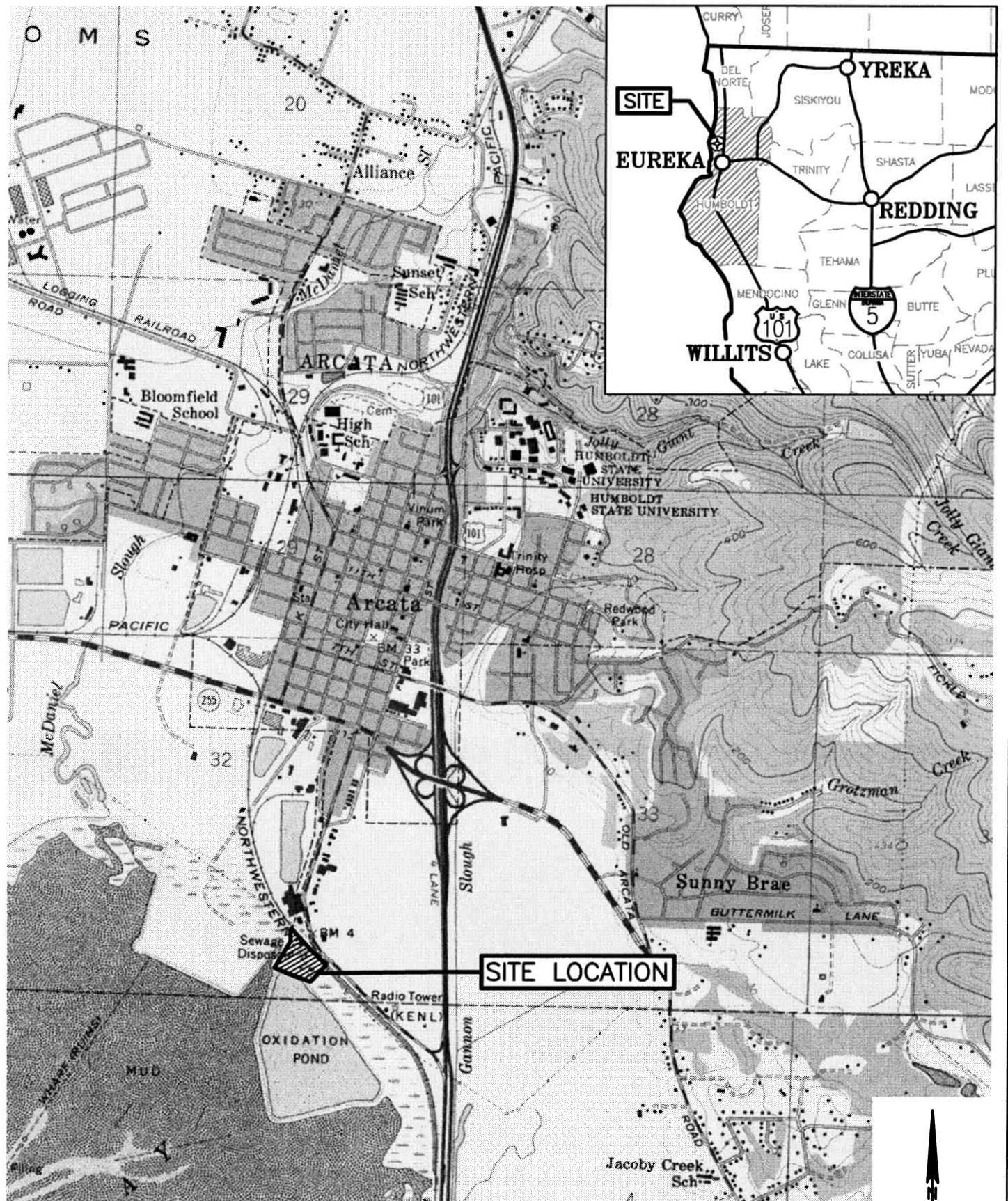
On July 20, 2005, City of Arcata personnel performed groundwater monitoring in wells MW-1 through MW-6, to aid in assessing current groundwater conditions beneath the site, including the direction of groundwater flow. A site map showing the locations of the existing monitoring wells is included as Figure 2. As part of the groundwater-monitoring program, each well was measured for depth to groundwater and sampled for water quality. During purging, each well was monitored for electrical conductivity and temperature using portable instrumentation, and pH was measured using portable pH test strips.

Upon completion of the well purging activities, a groundwater sample was collected from each well using a disposable polyethylene bailer, and transferred into laboratory-supplied containers. The water samples were then labeled, stored in an iced cooler, and transported to the laboratory under proper chain-of-custody documentation. Field notes from the July 20, 2005, groundwater-monitoring event are included in Appendix A.

2.2 Laboratory Analytical Methods

Each of the groundwater samples was analyzed for:

- Total Petroleum Hydrocarbons as Diesel (TPHD) with silica gel clean up in general accordance with U.S. Environmental Protection Agency (EPA) Method No. 3510 GCFID.
- Total Petroleum Hydrocarbons as Gasoline (TPHG) and Benzene, Toluene, Ethylbenzene, and total Xylenes (BTEX) in general accordance with EPA Method No. 8260B Modified.
- Fuel Oxygenates in general accordance with EPA Method No. 8260B Modified.

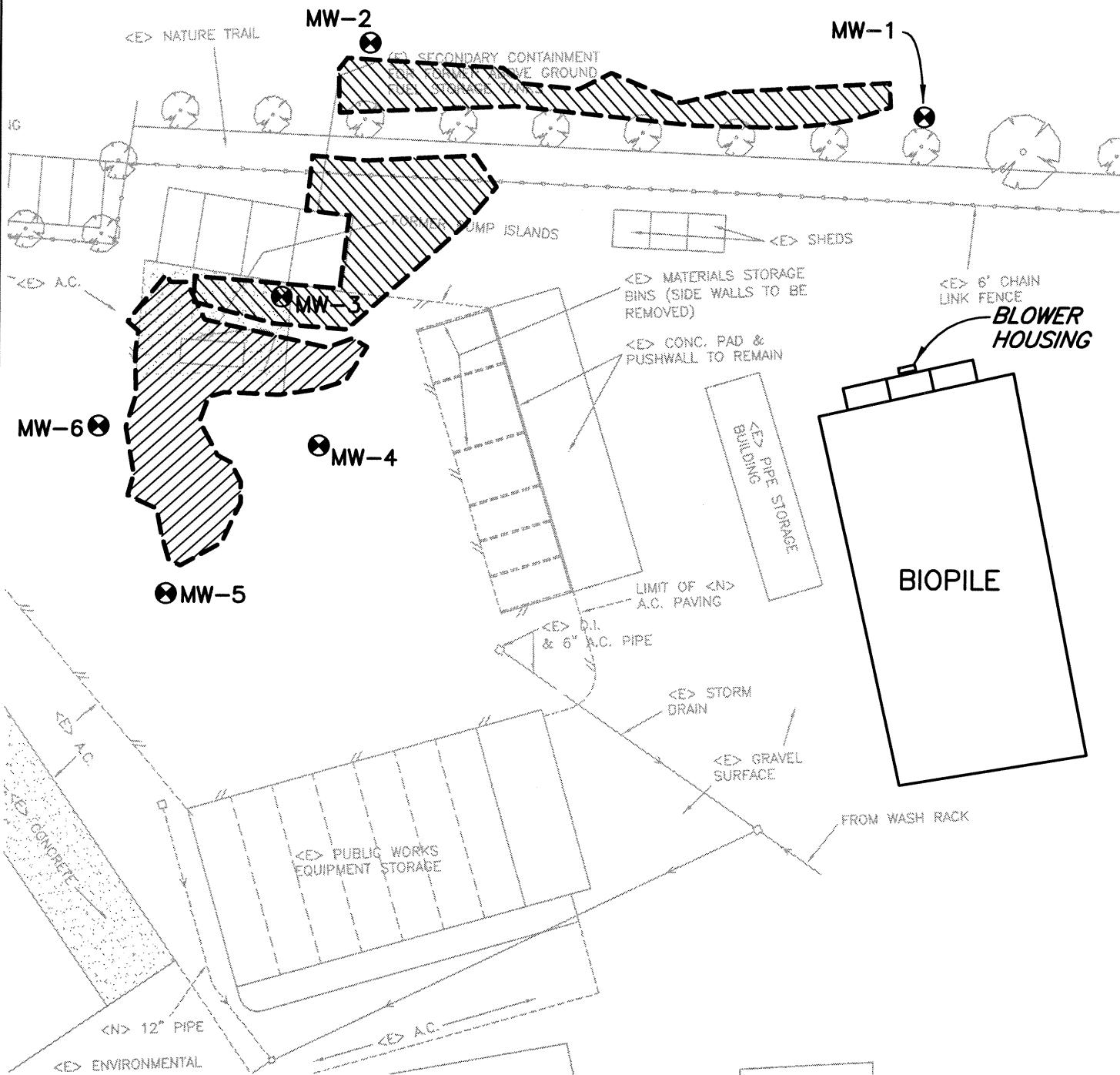


SOURCE: ARCATA NORTH & SOUTH
USGS 7.5 MINUTE
QUADRANGLE

1"=2000'±

| | | |
|--|---|-------------------------------------|
| SHN Consulting Engineers & Geologists, Inc. | City of Arcata Corp. Yard 600 South G Street Arcata, California | Site Location Map SHN 000108.100 |
| | August, 2005 | 000108.100-VIC-MAP |

Figure 1



EXPLANATION

MW-5 MONITORING WELL LOCATION AND DESIGNATION

LIMIT OF EXCAVATION NOVEMBER 2000

LIMIT OF EXCAVATION OCTOBER 2001

1"=40'

North Coast Laboratories Ltd., a state-certified analytical laboratory located in Arcata, California, performed all of the sample analyses.

2.3 Equipment Decontamination Procedures

All well purging and sampling equipment was cleaned prior to being transported to the corporation yard site. All small equipment that required on-site cleaning was decontaminated using the triple wash system. The equipment was first washed in a water solution containing Liquinox® cleaner, followed by a water rinse, then by a distilled water rinse. All of the groundwater samples were collected using pre-cleaned, disposable bailers, and transferred into laboratory-supplied containers.

2.4 Investigation-Derived Wastewater Management

Water used for decontaminating field equipment and all well purge water was placed into 5-gallon buckets, and subsequently transported to, and disposed of at, the City of Arcata wastewater treatment facility.

3.0 Groundwater Monitoring Results

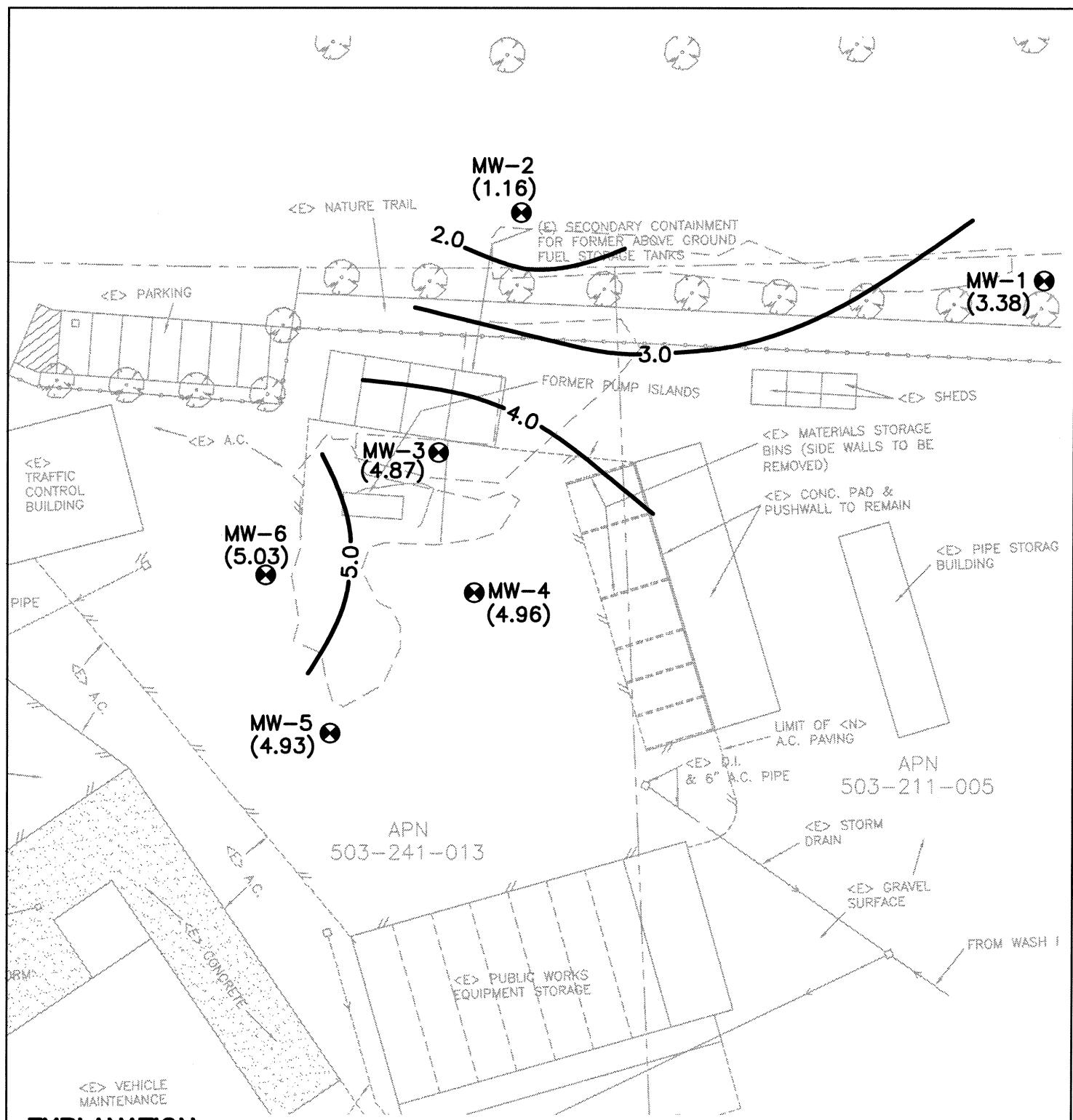
3.1 Hydrogeology

Depth-to-groundwater measurements were collected from each monitoring well prior to sampling, and are shown in Table 1. On July 20, 2005, the direction of groundwater flow beneath the site was inconsistent (Fig. 3). Historical groundwater elevation data are included in Appendix B, Table B-1.

| Table 1 Groundwater Elevations, July 20, 2005 City of Arcata Corporation Yard, Arcata, California | | | |
|---|---|---------------------------------------|--|
| Sample Location | Top of Casing Elevation ¹ (feet MSL) ² | Depth To Water (feet) ³ | Water Surface Elevation ¹ (feet MSL) |
| MW-1 | 8.73 | 5.35 | 3.38 |
| MW-2 | 9.86 | 8.70 | 1.16 |
| MW-3 | 6.97 | 2.10 | 4.87 |
| MW-4 | 6.96 | 2.00 | 4.96 |
| MW-5 | 6.83 | 1.90 | 4.93 |
| MW-6 | 6.73 | 1.70 | 5.03 |

1. Top of casing elevation referenced to City of Arcata Bench Mark #4, elevation.
2. Mean Sea Level (MSL).
3. Depth to water in feet below top of casing.

Gradient calculations were performed using MW-1, MW-2, and MW-3, only the groundwater gradient was 0.05 ft/ft toward the northeast. Due to localized groundwater mounding, MW-4, MW-5, and MW-6 were not used in the gradient calculations.



3.2 Groundwater Analytical Results

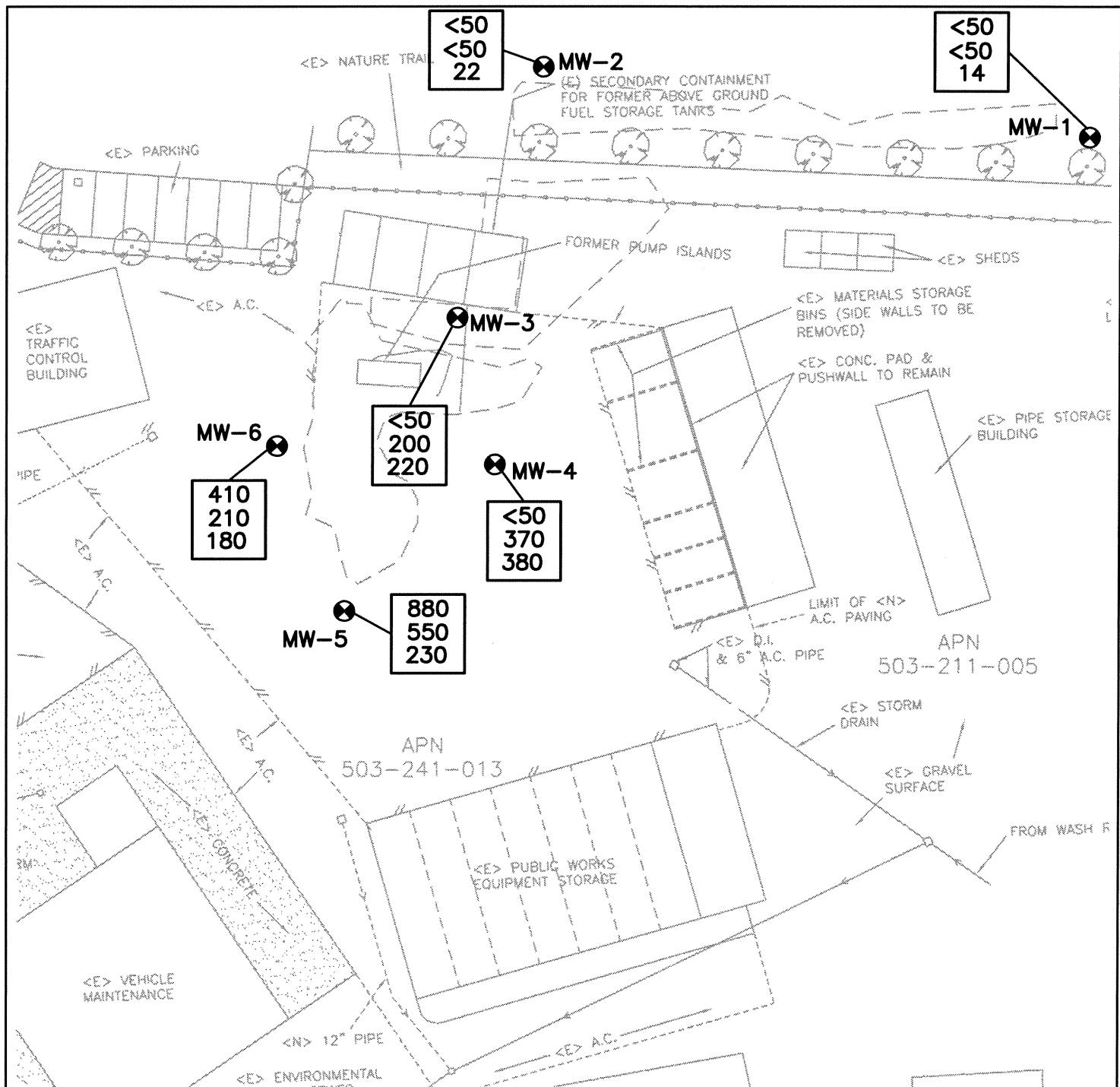
The laboratory analytical results from the July 20, 2005, groundwater-monitoring event are summarized in Table 2, and shown on Figure 4.

| Table 2 Groundwater Analytical Results, July 20, 2005 City of Arcata Corporation Yard, Arcata, California (in ug/L) ¹ | | | | | | | | | | | |
|---|-------------------|-------------------|----------------|----------------|----------------|----------------|-------------------|------------------|-------------------|-------------------|-------------------|
| Sample Location | TPHD ² | TPHG ³ | B ³ | T ³ | E ³ | X ³ | MTBE ³ | TBA ³ | DIPE ³ | ETBE ³ | TAME ³ |
| MW-1 | <50 ⁴ | <50 | <0.50 | <0.50 | <0.50 | <1.0 | 14 | <10 | <1.0 | <1.0 | <1.0 |
| MW-2 | <50 | <50 | <0.50 | <0.50 | <0.50 | <1.0 | 22 | <10 | <1.0 | <1.0 | 1.3 |
| MW-3 | <50 | 200 ⁵ | <0.50 | <0.50 | <0.50 | <1.0 | 220 | <50 ⁶ | <1.0 | <1.0 | 7.6 |
| MW-4 | <50 | 370 ⁵ | <0.50 | <0.50 | <0.50 | <1.0 | 380 | 95 | <1.0 | <1.0 | 11 |
| MW-5 | 880 ⁷ | 550 ⁸ | <0.50 | <0.50 | <0.50 | <1.0 | 230 | 39 | <1.0 | <1.0 | 5.3 |
| MW-6 | 410 ⁷ | 210 ⁵ | <0.50 | <0.50 | <0.50 | <1.0 | 180 | <60 ⁶ | <1.0 | <1.0 | 5.6 |

1. ug/L: micrograms per liter.
 2. TPHD: Total Petroleum Hydrocarbons as Diesel analyzed in general accordance with EPA Method 3510/GCFID.
 3. TPHG: Total Petroleum Hydrocarbons as Gasoline; Benzene, Toluene, Ethylbenzene and total Xylenes (BTEX); Methyl Tertiary-Butyl Ether (MTBE), Tertiary-Butyl Alcohol (TBA), Diisopropyl Ether (DIPE), Ethyl Tertiary-Butyl Ether (ETBE), and Tertiary-Amyl Butyl Ether (TAME), analyzed in general accordance with EPA Method 8260B.
 4. <: Denotes a value that is "less than" the method detection limit.
 5. The gasoline values are primarily from the reported additives.
 6. Reporting limits were raised due to matrix interference.
 7. Sample contains material similar to degraded or weathered diesel oil
 8. Sample includes the reported gasoline additives in addition to other peaks in the gasoline range.

TPHD was detected in the groundwater samples collected from wells MW-5 and MW-6 at concentrations of 880 micrograms per liter (ug/L) and 410 ug/L, respectively. TPHG was detected in the groundwater samples collected from 4 of the monitoring wells, at concentrations ranging from 200 ug/L in well MW-3, to 550 ug/L in well MW-5. TPHG was not detected in the groundwater samples collected from MW-1 and MW-2. TPHG values observed in wells MW-3, MW-4, and MW-6 are primarily from gasoline additives. No detectable concentrations of benzene, toluene, ethylbenzene, or total xylenes were present in any groundwater samples collected during the July 20, 2005 sampling event.

Methyl Tertiary-Butyl Ether (MTBE) was detected in all of the groundwater samples that were collected during the July 20, 2005, monitoring event. Historical groundwater analytical results are presented in Appendix B, Table B-2. The complete laboratory analytical report and corresponding chain-of-custody documentation are included in Appendix C.



EXPLANATION

MW-5 MONITORING WELL LOCATION AND DESIGNATION

<50
370
380

TPHD
TPHG
MTBE

} RESULTS IN ug/l

1"=40'

3.3 Groundwater Extraction and Treatment System

The groundwater extraction and treatment system was operated from May 2004 to April 2005. The system extracted and treated approximately 96,000 gallons of groundwater.

3.4 Biopile Monitoring

The biopile was constructed in September 2003 and is currently monitored monthly for blower manifold readings, soil temperature readings, and general condition observations. Field notes from the third quarter biopile monitoring events are included in Appendix A.

4.0 Discussion and Recommendations

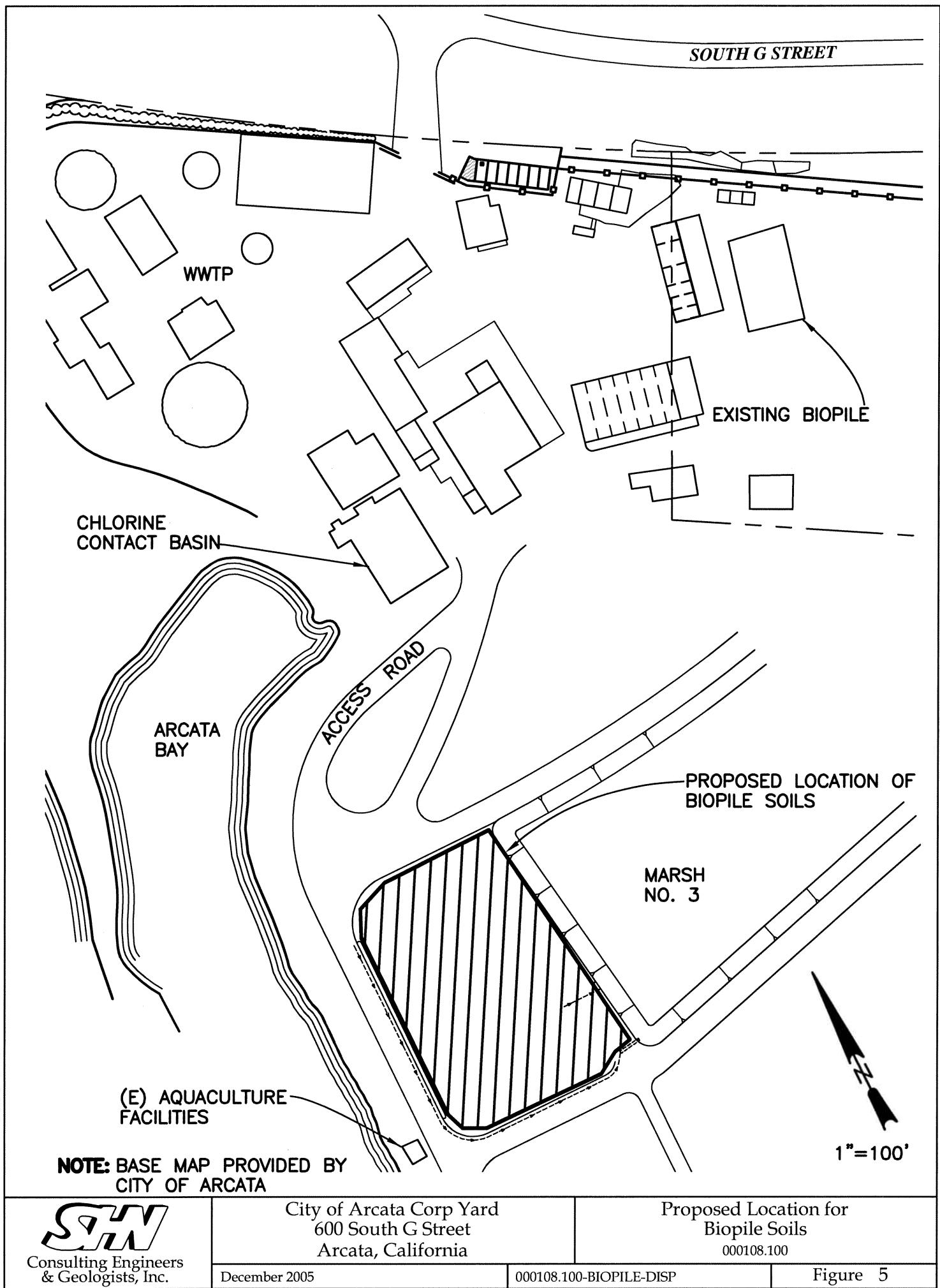
The results of this quarterly monitoring program indicate that groundwater at the corporation yard site has been impacted by petroleum hydrocarbons and fuel oxygenates. The groundwater extraction and treatment system was taken off line in April 2005. SHN is recommending that the system be replaced with an air sparging system. SHN conducted an air sparge pilot test on April 29, 2005, using the existing groundwater extraction piping located at the base of the October 2001 excavation pit (SW-1). Results of the pilot test are presented in a report of findings (SHN, May 2005).

Based on the reduction of TPHG and TPHD concentrations in the biopile soil, SHN is recommending closure for the biopile. Pending closure approval, SHN will collect 4 samples for every 100 cubic yards of soil and the analytical laboratory will composite each set of four samples into one for analysis. Using the approximate 1,000 cubic yard volume of the biopile, 10-four point composite samples will be analyzed. Soil samples will be analyzed for TPHMO, TPHD, TPHG, BTEX, and MTBE.

SHN is also recommending that the biopile soil be moved to a 30,000-square foot area located west of marsh #3 at the Arcata Corp Yard site, where it will be spread out, mulched, seeded, and fertilized (Figure 5) to promote final treatment via phyto remediation and reduce any erosion of soils. Additional microbial activity will occur in the root zone (rhizosphere) of the planted grasses, which will promote biodegradation of any residual petroleum hydrocarbons. These soils will be spread out and will be less than 1 foot in thickness. The proposed area to place the biopile drains into marsh #3, which is part of the City of Arcata wastewater treatment facility.

5.0 References Cited

- SHN Consulting Engineers & Geologists, Inc. (March 2004). *Remedial Action Implementation Report (RAIR), Biopile Soil Remediation, City of Arcata Corporation Yard, 600 South G Street, Arcata, California*. Eureka: SHN
- . (May 2005). *Remedial Action Pilot Study, Report of Findings, City of Arcata Corporation Yard, 600 South G Street, Arcata, California*. Eureka: SHN



Appendix A
Field Notes

WELL NO.
TOTAL DEPTH
DEPTH
TO WATER

MW-1
17.80
5.35

ELEVATION
WATER
ELEVATION

7/20/05

HT OF WATER COLUMN 12.45 $\times (0.16) \text{ Casing Vol } (1.99) \times 3 = 6 \text{ gal}$

| DEPTH | TIME | TIME | WATER REMOVED | EC | TEMP | pH |
|-------|-------|------|---------------|---------|--------|------|
| | 9:30 | | 0 | | | |
| | 10:00 | | 2 | 575 ppm | 19.7°C | 7.61 |
| | 10:10 | | 4 | 688 ppm | 18.6°C | 7.14 |
| | 10:20 | | 6 | 745 ppm | 16.6°C | 6.45 |
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TOTAL
INITIAL WATER VOLUME _____

SAMPLING EQUIPMENT
SAMPLE TIME
SAMPLE ANALYSIS
LABORATORY
REMARKS

DISPOSABLE BAUDIC

824.0 LSTL; TPHO
N.C.L.

WELL NO.
TOTAL DEPTH
DEPTH
TO WATER

M W -2
18.35
8.70

ELEVATION
WATER
ELEVATION

11-20-05
7/20/05

HT OF WATER COLUMN

9.65 x (0.16) Casing VOL 154 x 3 = 4.6 gal

| DEPTH | TIME | TIME | WATER REMOVED | EC | TEMP | pH |
|-------|-------|------|----------------------|-------------------|------|----|
| | 9:35 | 0 | | | | |
| | 10:30 | 1.5 | 2000 ^{t Pm} | 19.4 ^c | 6.40 | |
| | 10:40 | 3.0 | 2000 ^{t Pm} | 18.0 ^c | 6.88 | |
| | 10:50 | 4.5 | 2000 ^{t Pm} | 17.8 ^c | 6.51 | |
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TOTAL
INITIAL WATER VOLUME

SAMPLING EQUIPMENT
SAMPLE TIME
SAMPLE ANALYSIS
LABORATORY
REMARKS

DISPOSABLE BAILEY

8240 LIST 1; TPHD
N.C.L.

WELL NO.
TOTAL DEPTH
DEPTH
TO WATER

MW-3

14.70

210

ELEVATION
WATER
ELEVATION

7/20/05

HT OF WATER COLUMN 12.60 X (0.16) Casing VOL 2.02 x3 = 6.72

| DEPTH | TIME | TIME | WATER REMOVED | EC | TEMP | pH |
|-------|-------|------|---------------|--------------------|---------|------|
| | 9:50 | | 0 | | | |
| | 11:40 | | 2 | 881 ^{mm} | 22.0 °C | 6.66 |
| | 11:45 | | 4 | 1013 ^{mm} | 22.9 °C | 6.41 |
| | 11:50 | | 6 | 1187 ^{mm} | 21.7 °C | 6.58 |
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TOTAL
INITIAL WATER VOLUME

SAMPLING EQUIPMENT
SAMPLE TIME
SAMPLE ANALYSIS
LABORATORY
REMARKS

DISPOSABLE BAILEY

8240 LIST 1; TPHD
N.L.

WELL NO.
TOTAL DEPTH
DEPTH
TO WATER

MW-4
14.70
2.00

ELEVATION
WATER
ELEVATION

7/20/05
7/20/05

HT OF WATER COLUMN 12.70 X (0.16) Casing Vol 2.03 x 3 = 6 gal

| DEPTH | TIME | TIME | WATER REMOVED | EC | TEMP | pH |
|-------|-------|------|---------------|----------------------|--------------------|------|
| | 9:40 | | 0 | | | |
| | 11:00 | | 2 | 1981 ^{mm} | 24.5 ^{°C} | 6.22 |
| | 11:10 | | 2 | 2000 ^{t/mm} | 21.9 ^{°C} | 6.35 |
| | 11:20 | | 2 | 2000 ^{t/mm} | 20.7 ^{°C} | 6.47 |
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TOTAL
INITIAL WATER VOLUME

SAMPLING EQUIPMENT
SAMPLE TIME
SAMPLE ANALYSIS
LABORATORY
REMARKS

DISPOSABLE BOTTLE

TUBE LIST 1; TPHD
N.E.L.

WELL NO.
TOTAL DEPTH
DEPTH
TO WATER

MW-5

14.65

6.90

ELEVATION
WATER
ELEVATION

7/20/05
7/20/05

HT OF WATER COLUMN

12.95 X (0.16) CASING VOL 2.07 X 3 = 6 gal.

| DEPTH | TIME | TIME | WATER REMOVED | EC ppm | TEMP | pH |
|-------|-------|------|---------------|--------|-------|------|
| | 9:55 | | 0 | | | |
| | 11:55 | | 2 | 1025 | 22.6° | 6.18 |
| | 12:00 | | 4 | 1104 | 21.7° | 6.22 |
| | 12:05 | | 6 | 1217 | 21.5° | 5.94 |
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TOTAL
INITIAL WATER VOLUME

SAMPLING EQUIPMENT
SAMPLE TIME
SAMPLE ANALYSIS
LABORATORY
REMARKS

DISPOSABLE BAILEY

8260 LIST 1; TPHD
N.C.L.

WELL NO.
TOTAL DEPTH
DEPTH
TO WATER

MW-6

14.75
1.70

ELEVATION
WATER
ELEVATION

01/20/05
7/20/05

HT OF WATER COLUMN 13.05 X (0.16) Casing VOL 2.08 X 3 = 6 gal

| DEPTH | TIME | TIME | WATER REMOVED | EC | TEMP | pH |
|-------|-------|------|---------------------|---------|------|----|
| | 9:45 | | 0 | | | |
| | 11:25 | 2 | 1295 ^{ppm} | 25.6 °C | 6.35 | |
| | 11:30 | 4 | 1394 ^{ppm} | 20.5 °C | 6.50 | |
| | 11:35 | 6 | 1456 ^{ppm} | 21.5 °C | 6.39 | |
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TOTAL
INITIAL WATER VOLUME _____

SAMPLING EQUIPMENT
SAMPLE TIME
SAMPLE ANALYSIS
LABORATORY
REMARKS

DISPOSABLE BOTTLES

8260 LIST 1; TPHD
N.C.2.



DAILY FIELD REPORT

Job No. 000108.100

Page _____ of _____

Daily Field Report Sequence No

Date
7/8/05Day Of Week
Fr.

Project Engineer

Mike Foget

Supervisor

Weather

Sunny

Technician

Dustin Tibbets

Key Persons Contacted (Civil Engr, Architect, Developer, Etc)

Describe Equipment Used For Hauling, Spreading, Watering, Conditioning, & Compacting

1245 On site taking readings

1255 Pump and treat meter reading = 12803.79 cubic feet

1300 off site

Copy given to:

Reported By:

Dustin Tibbets

**Monthly Monitoring
City of Arcata, Corp Yard
000108.100**

| Technician: | Date: | Time: | |
|--|---|---|---|
| <i>Dustin Tibbets</i> | <i>7/8/05</i> | <i>1247</i> | |
| Weather Conditions: <i>Sun</i> | Ambient Air Temperature: <i>79°</i> | | |
| Time Settings Before Adjustments: | | Time Settings After Adjustments: | |
| Blower "A": ON from <i>8 am</i> to <i>4 pm</i> | | Blower "A": ON from _____ to _____ | |
| Blower "B": ON from <i>8 am</i> to <i>4 pm</i> | | Blower "B": ON from _____ to _____ | |
| <u>Blower "A" Manifold Readings:</u> | | <u>Blower "B" Manifold Readings:</u> | |
| Line Temperature: <i>80°</i> °F | | Line Temperature: <i>80°</i> °F | |
| Line Pressure: <i>N/A</i> in-H ₂ O | | Line Pressure: <i>4.5</i> in-H ₂ O | |
| Air Velocity (Line 1) <i>1525</i> ft/min | Air Velocity (Line 2) <i>2310</i> ft/min | Air Velocity (Line 3) <i>2680</i> ft/min | Air Velocity (Line 4) <i>2880</i> ft/min |
| Soil Vapor Readings: | | Gas Meter Used: | |
| | | Gas Meter Calibration: | |
| Sample Port | VOC's (ppm) | O ₂ (%) | CO ₂ (%) |
| #1 | | | |
| #2 | | | |
| #3 | | | |
| #4 | | | |
| #5 | | | |
| Soil Temperature Readings: | | | |
| #1 | #2 | #3 | #4 |
| <i>60°</i> °F | <i>60°</i> °F | <i>N/A</i> °F | <i>57°</i> °F |
| Condition of Bio-Pile Cover: | | | |
| Condition of Cover Hold-Downs: | | | |
| Additional Observations: | | | |



DAILY FIELD REPORT

Job No. 000108.100

Page _____ of _____

| | | |
|---|--|--|
| Project Name <i>Arcata Corp Yard</i> | Client/Owner <i>City of Arcata</i> | Daily Field Report Sequence No |
| General Location Of Work | Owner/Client Representative | Date <i>8/18/05</i> Day Of Week <i>Thur.</i> |
| General Contractor | Grading Contractor | Project Engineer <i>Mike Foget</i> |
| Type Of Work | Grading Contractor, Superintendent, Or Foreman | Supervisor |
| Source & Description Of Fill Material | Weather <i>Overcast</i> | Technician <i>Dustin Tibbets</i> |
| Key Persons Contacted (Civil Engr, Architect, Developer, Etc) | | |

Describe Equipment Used For Hauling, Spreading, Watering, Conditioning, & Compacting

1550 On site.

1553 Taking readings

Pump & treat system reading = 12803.79 cubic feet.

1602 loaded up

1610 off site.

Copy given to:

Reported By:

Dustin Tibbets

**Monthly Monitoring
City of Arcata, Corp Yard
000108.100**

| Technician: | Date: | Time: | |
|---|---|--|---|
| <i>Dustin Tibbetts</i> | <i>8/18/05</i> | <i>1553</i> | |
| Weather Conditions: | | Ambient Air Temperature: <i>Overcast</i> <i>74°</i> | |
| Time Settings Before Adjustments: | | Time Settings After Adjustments: | |
| Blower "A": ON from <i>8 am</i> to <i>4 pm</i> | | Blower "A": ON from _____ to _____ | |
| Blower "B": ON from <i>8 am</i> to <i>4 pm</i> | | Blower "B": ON from _____ to _____ | |
| Blower "A" Manifold Readings: | | Blower "B" Manifold Readings: | |
| Line Temperature: <i>78°</i> °F | | Line Temperature: <i>70°</i> °F | |
| Line Pressure: <i>N/A</i> in-H ₂ O | | Line Pressure: <i>N/A</i> in-H ₂ O | |
| Air Velocity (Line 1) <i>1450</i> ft/min | Air Velocity (Line 2) <i>2170</i> ft/min | Air Velocity (Line 3) <i>2350</i> ft/min | Air Velocity (Line 4) <i>2260</i> ft/min |
| Soil Vapor Readings: | | Gas Meter Used: | |
| | | Gas Meter Calibration: | |
| Sample Port | VOC's (ppm) | O ₂ (%) | CO ₂ (%) |
| #1 | | | |
| #2 | | | |
| #3 | | | |
| #4 | | | |
| #5 | | | |
| Soil Temperature Readings: | | | |
| #1 <i>60°</i> °F | #2 <i>60°</i> °F | #3 <i>missing</i> °F | #4 <i>74°</i> °F |
| Condition of Bio-Pile Cover: <i>Fair</i> <i>Not to be piled on</i> | | | |
| Condition of Cover Hold-Downs: <i>Good</i> | | | |
| Additional Observations: | | | |

Appendix B

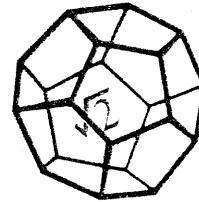
Historic Monitoring Data

| Table B-1 Historical Groundwater Elevations City of Arcata Corporation Yard; Arcata, CA | | | | |
|---|-------------|---|---------------------------------------|-------------------------------------|
| Sample Location | Sample Date | Elevation ¹ (feet MSL) ² | Depth to Water (feet) ³ | Groundwater Elevation (feet MSL) |
| MW-1 | 9/26/2002 | 8.73 | 7.73 | 1.00 |
| | 1/22/2003 | | 5.79 | 2.94 |
| | 4/23/2003 | | 5.33 | 3.40 |
| | 7/23/2003 | | 6.60 | 2.13 |
| | 10/22/2003 | | 7.34 | 1.39 |
| | 1/21/2004 | | 3.90 | 4.83 |
| | 4/21/2004 | | 3.81 | 4.92 |
| | 7/21/2004 | | 5.72 | 3.01 |
| | 10/7/2004 | | 7.33 | 1.40 |
| | 1/19/2005 | | 5.80 | 2.93 |
| | 4/20/2005 | | 4.73 | 4.00 |
| | 7/20/2005 | | 5.35 | 3.38 |
| | | | | |
| MW-2 | 9/27/2002 | 9.86 | 8.82 | 1.04 |
| | 1/22/2003 | | 6.44 | 3.42 |
| | 4/23/2003 | | 9.38 | 0.48 |
| | 7/23/2003 | | 8.90 | 0.96 |
| | 10/22/2003 | | 8.70 | 1.16 |
| | 1/21/2004 | | 7.38 | 2.48 |
| | 4/21/2004 | | 9.53 | 0.33 |
| | 7/21/2004 | | 8.10 | 1.76 |
| | 10/7/2004 | | 8.76 | 1.10 |
| | 1/19/2005 | | 9.00 | 0.86 |
| | 4/20/2005 | | 8.72 | 1.14 |
| | 7/20/2005 | | 8.70 | 1.16 |
| | | | | |
| MW-3 | 9/26/2002 | 6.97 | 2.84 | 4.13 |
| | 1/22/2003 | | 1.36 | 5.61 |
| | 4/23/2003 | | 1.11 | 5.86 |
| | 7/23/2003 | | 2.50 | 4.47 |
| | 10/22/2003 | | 2.81 | 4.16 |
| | 1/21/2004 | | 3.27 | 3.70 |
| | 4/21/2004 | | 1.00 | 5.97 |
| | 7/21/2004 | | 2.95 | 4.02 |
| | 10/7/2004 | | 3.59 | 3.38 |
| | 1/19/2005 | | 1.45 | 5.52 |
| | 4/20/2005 | | 1.02 | 5.95 |
| | 7/20/2005 | | 2.10 | 4.87 |
| | | | | |
| MW-4 | 9/27/2002 | 6.96 | 4.01 | 2.95 |
| | 1/22/2003 | | 2.36 | 4.60 |
| | 4/23/2003 | | 2.35 | 4.61 |
| | 7/23/2003 | | 2.50 | 4.46 |
| | 10/22/2003 | | 4.34 | 2.62 |
| | 1/21/2004 | | 1.26 | 5.70 |
| | 4/21/2004 | | 3.67 | 3.29 |
| | 7/21/2004 | | 5.20 | 1.76 |
| | 10/7/2004 | | 4.15 | 2.81 |
| | 1/19/2005 | | 3.75 | 3.21 |
| | 4/20/2005 | | 3.52 | 3.44 |
| | 7/20/2005 | | 2.00 | 4.96 |
| | | | | |
| MW-5 | 9/26/2002 | 6.83 | 2.70 | 4.13 |
| | 1/22/2003 | | 1.24 | 5.59 |
| | 4/23/2003 | | 1.05 | 5.78 |
| | 7/23/2003 | | 2.30 | 4.53 |
| | 10/22/2003 | | 2.68 | 4.15 |
| | 1/21/2004 | | 1.18 | 5.65 |
| | 4/21/2004 | | 0.50 | 6.33 |
| | 7/21/2004 | | 3.80 | 3.03 |
| | 10/7/2004 | | 2.95 | 3.88 |
| | 1/19/2005 | | 1.41 | 5.42 |
| | 4/20/2005 | | 1.05 | 5.78 |
| | 7/20/2005 | | 1.90 | 4.93 |
| | | | | |
| MW-6 | 9/27/2002 | 6.73 | 5.11 | 1.62 |
| | 1/22/2003 | | 3.23 | 3.50 |
| | 4/23/2003 | | 1.91 | 4.82 |
| | 7/23/2003 | | 5.60 | 1.13 |
| | 10/22/2003 | | 3.75 | 2.98 |
| | 1/21/2004 | | 1.71 | 5.02 |
| | 4/21/2004 | | 5.65 | 1.08 |
| | 7/21/2004 | | 2.70 | 4.03 |
| | 10/7/2004 | | 3.16 | 3.57 |
| | 1/19/2005 | | 1.80 | 4.93 |
| | 4/20/2005 | | 1.00 | 5.73 |
| | 7/20/2005 | | 1.70 | 5.03 |
| | | | | |

1. Top of casing elevation referenced to City of Arcata Bench Mark #4, elevation
 2. Mean Sea Level (MSL).
 3. Below Top of Casing

Appendix C

Laboratory Analytical Reports



**NORTH COAST
LABORATORIES LTD.**

August 02, 2005

City of Arcata
Dept. of Public Works
736 F Street
Arcata, CA 95521
Attn: Kim Watson

RE: 000108100, Arcata Corp Yard

Order No.: 0507355
Invoice No.: 51758
PO No.:
ELAP No. 1247-Expires July 2006

SAMPLE IDENTIFICATION

| Fraction | Client Sample Description |
|----------|---------------------------|
| 01A | MW-1 |
| 01D | MW-1 |
| 02A | MW-2 |
| 02D | MW-2 |
| 03A | MW-4 |
| 03D | MW-4 |
| 04A | MW-6 |
| 04D | MW-6 |
| 05A | MW-3 |
| 05D | MW-3 |
| 06A | MW-5 |
| 06D | MW-5 |
| 07A | Travel Blank |

ND = Not Detected at the Reporting Limit

Limit = Reporting Limit

All solid results are expressed on a wet-weight basis unless otherwise noted.

REPORT CERTIFIED BY

Laboratory Supervisor(s)

QA Unit

Jesse G. Chaney, Jr.
Laboratory Director

CLIENT: City of Arcata
Project: 000108100, Arcata Corp Yard
Lab Order: 0507355

CASE NARRATIVE

All samples submitted for a silica gel cleanup were initially analyzed for diesel. The samples showing no detectable levels of the analyte were not subjected to the cleanup procedure.

TPH as Diesel with Silica Gel Cleanup:

Samples MW-6 and MW-5 contain material similar to degraded or weathered diesel oil.

The surrogate recovery for sample MW-4 was outside of the acceptance limits. The surrogate recoveries for the quality control samples were within the acceptance limits. This indicates that the low surrogate recovery may be due to matrix effects from the sample.

Gasoline Components/Additives:

The gasoline value for sample MW-5 includes the reported gasoline additives in addition to other peaks in the gasoline range.

The gasoline values for samples MW-4, MW-6 and MW-3 are primarily from the reported gasoline additives.

Some reporting limits were raised for samples MW-6 and MW-3 due to matrix interference.

Date: 02-Aug-05
WorkOrder: 0507355

ANALYTICAL REPORT

Client Sample ID: MW-1 Received: 7/20/05 Collected: 7/20/05 14:25
Lab ID: 0507355-01A

Test Name: Gasoline Components/Additives

Reference: LUFT/EPA 8260B Modified

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|-----------------------------------|--------|----------|-------|-----|-----------|----------|
| Methyl tert-butyl ether (MTBE) | 14 | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Tert-butyl alcohol (TBA) | ND | 10 | µg/L | 1.0 | | 7/22/05 |
| Di-isopropyl ether (DIPE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Ethyl tert-butyl ether (ETBE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Benzene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Tert-amyl methyl ether (TAME) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Toluene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Ethylbenzene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| m,p-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| o-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Surrogate: 1,4-Dichlorobenzene-d4 | 98.8 | 80.8-139 | % Rec | 1.0 | | 7/22/05 |

Test Name: TPH as Gasoline

Reference: LUFT/EPA 8260B Modified

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|---------------|--------|-------|-------|-----|-----------|----------|
| TPHC Gasoline | ND | 50 | µg/L | 1.0 | | 7/22/05 |

Client Sample ID: MW-1

Received: 7/20/05

Collected: 7/20/05 14:25

Lab ID: 0507355-01D

Test Name: TPH as Diesel

Reference: EPA 3510/GCFID(LUFT)/EPA 8015B

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|------------------------|--------|--------|-------|-----|-----------|----------|
| TPHC Diesel (C12-C22) | ND | 50 | µg/L | 1.0 | 7/22/05 | 7/22/05 |
| Surrogate: N-Tricosane | 79.2 | 70-130 | % Rec | 1.0 | 7/22/05 | 7/22/05 |

Date: 02-Aug-05
WorkOrder: 0507355

ANALYTICAL REPORT

Client Sample ID: MW-2
Lab ID: 0507355-02A

Received: 7/20/05

Collected: 7/20/05 14:30

Test Name: Gasoline Components/Additives

Reference: LUFT/EPA 8260B Modified

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|-----------------------------------|--------|----------|-------|-----|-----------|----------|
| Methyl tert-butyl ether (MTBE) | 22 | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Tert-butyl alcohol (TBA) | ND | 10 | µg/L | 1.0 | | 7/22/05 |
| Di-isopropyl ether (DIPE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Ethyl tert-butyl ether (ETBE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Benzene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Tert-amyl methyl ether (TAME) | 1.3 | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Toluene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Ethylbenzene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| m,p-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| o-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Surrogate: 1,4-Dichlorobenzene-d4 | 97.8 | 80.8-139 | % Rec | 1.0 | | 7/22/05 |

Test Name: TPH as Gasoline

Reference: LUFT/EPA 8260B Modified

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|---------------|--------|-------|-------|-----|-----------|----------|
| TPHC Gasoline | ND | 50 | µg/L | 1.0 | | 7/22/05 |

Client Sample ID: MW-2

Received: 7/20/05

Collected: 7/20/05 14:30

Lab ID: 0507355-02D

Test Name: TPH as Diesel

Reference: EPA 3510/GCFID(LUFT)/EPA 8015B

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|------------------------|--------|--------|-------|-----|-----------|----------|
| TPHC Diesel (C12-C22) | ND | 50 | µg/L | 1.0 | 7/22/05 | 7/22/05 |
| Surrogate: N-Tricosane | 76.1 | 70-130 | % Rec | 1.0 | 7/22/05 | 7/22/05 |

Date: 02-Aug-05
WorkOrder: 0507355

ANALYTICAL REPORT

Client Sample ID: MW-4
Lab ID: 0507355-03A

Received: 7/20/05

Collected: 7/20/05 14:15

Test Name: Gasoline Components/Additives

Reference: LUFT/EPA 8260B Modified

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|-----------------------------------|--------|----------|-------|-----|-----------|----------|
| Methyl tert-butyl ether (MTBE) | 380 | 50 | µg/L | 50 | | 7/22/05 |
| Tert-butyl alcohol (TBA) | 95 | 10 | µg/L | 1.0 | | 7/22/05 |
| Di-isopropyl ether (DIPE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Ethyl tert-butyl ether (ETBE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Benzene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Tert-amyl methyl ether (TAME) | 11 | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Toluene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Ethylbenzene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| m,p-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| o-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Surrogate: 1,4-Dichlorobenzene-d4 | 99.7 | 80.8-139 | % Rec | 1.0 | | 7/22/05 |

Test Name: TPH as Gasoline

Reference: LUFT/EPA 8260B Modified

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|---------------|--------|-------|-------|-----|-----------|----------|
| TPHC Gasoline | 370 | 50 | µg/L | 1.0 | | 7/22/05 |

Client Sample ID: MW-4

Received: 7/20/05

Collected: 7/20/05 14:15

Lab ID: 0507355-03D

Test Name: TPH as Diesel with Silica Gel Cleanup

Reference: EPA 3510/3630/GCFID(LUFT)/8015B

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|------------------------|--------|--------|-------|-----|-----------|----------|
| TPHC Diesel (C12-C22) | ND | 50 | µg/L | 1.0 | 7/27/05 | 7/29/05 |
| Surrogate: N-Tricosane | 67.9 | 70-130 | % Rec | 1.0 | 7/27/05 | 7/29/05 |

Date: 02-Aug-05
WorkOrder: 0507355

ANALYTICAL REPORT

Client Sample ID: MW-6
Lab ID: 0507355-04A

Received: 7/20/05

Collected: 7/20/05 13:55

Test Name: Gasoline Components/Additives

Reference: LUFT/EPA 8260B Modified

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|-----------------------------------|--------|----------|-------|-----|-----------|----------|
| Methyl tert-butyl ether (MTBE) | 180 | 50 | µg/L | 50 | | 7/22/05 |
| Tert-butyl alcohol (TBA) | ND | 60 | µg/L | 1.0 | | 7/23/05 |
| Di-isopropyl ether (DIPE) | ND | 1.0 | µg/L | 1.0 | | 7/23/05 |
| Ethyl tert-butyl ether (ETBE) | ND | 1.0 | µg/L | 1.0 | | 7/23/05 |
| Benzene | ND | 0.50 | µg/L | 1.0 | | 7/23/05 |
| Tert-amyl methyl ether (TAME) | 5.6 | 1.0 | µg/L | 1.0 | | 7/23/05 |
| Toluene | ND | 0.50 | µg/L | 1.0 | | 7/23/05 |
| Ethylbenzene | ND | 0.50 | µg/L | 1.0 | | 7/23/05 |
| m,p-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/23/05 |
| c-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/23/05 |
| Surrogate: 1,4-Dichlorobenzene-d4 | 102 | 80.8-139 | % Rec | 1.0 | | 7/23/05 |

Test Name: TPH as Gasoline

Reference: LUFT/EPA 8260B Modified

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|---------------|--------|-------|-------|-----|-----------|----------|
| TPHC Gasoline | 210 | 50 | µg/L | 1.0 | | 7/23/05 |

Client Sample ID: MW-6

Received: 7/20/05

Collected: 7/20/05 13:55

Lab ID: 0507355-04D

Test Name: TPH as Diesel with Silica Gel Cleanup

Reference: EPA 3510/3630/GCFID(LUFT)/8015B

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|------------------------|--------|--------|-------|-----|-----------|----------|
| TPHC Diesel (C12-C22) | 410 | 50 | µg/L | 1.0 | 7/27/05 | 7/29/05 |
| Surrogate: N-Tricosane | 87.8 | 70-130 | % Rec | 1.0 | 7/27/05 | 7/29/05 |

Date: 02-Aug-05
WorkOrder: 0507355

ANALYTICAL REPORT

Client Sample ID: MW-3
Lab ID: 0507355-05A

Received: 7/20/05

Collected: 7/20/05 14:05

Test Name: Gasoline Components/Additives

Reference: LUFT/EPA 8260B Modified

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|-----------------------------------|--------|----------|-------|-----|-----------|----------|
| Methyl tert-butyl ether (MTBE) | 220 | 20 | µg/L | 20 | | 7/26/05 |
| Tert-butyl alcohol (TBA) | ND | 50 | µg/L | 1.0 | | 7/22/05 |
| Di-isopropyl ether (DIPE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Ethyl tert-butyl ether (ETBE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Benzene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Tert-amyl methyl ether (TAME) | 7.6 | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Toluene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Ethylbenzene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| m,p-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| o-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Surrogate: 1,4-Dichlorobenzene-d4 | 99.1 | 80.8-139 | % Rec | 1.0 | | 7/22/05 |

Test Name: TPH as Gasoline

Reference: LUFT/EPA 8260B Modified

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|---------------|--------|-------|-------|-----|-----------|----------|
| TPHC Gasoline | 200 | 50 | µg/L | 1.0 | | 7/22/05 |

Client Sample ID: MW-3

Received: 7/20/05

Collected: 7/20/05 14:05

Lab ID: 0507355-05D

Test Name: TPH as Diesel with Silica Gel Cleanup

Reference: EPA 3510/3630/GCFID(LUFT)/8015B

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|------------------------|--------|--------|-------|-----|-----------|----------|
| TPHC Diesel (C12-C22) | ND | 50 | µg/L | 1.0 | 7/27/05 | 7/29/05 |
| Surrogate: N-Tricosane | 79.2 | 70-130 | % Rec | 1.0 | 7/27/05 | 7/29/05 |

Date: 02-Aug-05
WorkOrder: 0507355

ANALYTICAL REPORT

Client Sample ID: MW-5
Lab ID: 0507355-06A

Received: 7/20/05

Collected: 7/20/05 13:50

Test Name: Gasoline Components/Additives

Reference: LUFT/EPA 8260B Modified

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|-----------------------------------|--------|----------|-------|-----|-----------|----------|
| Methyl tert-butyl ether (MTBE) | 230 | 50 | µg/L | 50 | | 7/22/05 |
| Tert-butyl alcohol (TBA) | 39 | 10 | µg/L | 1.0 | | 7/22/05 |
| Di-isopropyl ether (DIPE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Ethyl tert-butyl ether (ETBE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Benzene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Tert-amyl methyl ether (TAME) | 5.3 | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Toluene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Ethylbenzene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| m,p-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| o-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Surrogate: 1,4-Dichlorobenzene-d4 | 105 | 80.8-139 | % Rec | 1.0 | | 7/22/05 |

Test Name: TPH as Gasoline

Reference: LUFT/EPA 8260B Modified

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|---------------|--------|-------|-------|-----|-----------|----------|
| TPHC Gasoline | 550 | 50 | µg/L | 1.0 | | 7/22/05 |

Client Sample ID: MW-5

Received: 7/20/05

Collected: 7/20/05 13:50

Lab ID: 0507355-06D

Test Name: TPH as Diesel with Silica Gel Cleanup

Reference: EPA 3510/3630/GCFID(LUFT)/8015B

| Parameter | Result | Limit | Units | DF | Extracted | Analyzed |
|------------------------|--------|--------|-------|-----|-----------|----------|
| TPHC Diesel (C12-C22) | 880 | 50 | µg/L | 1.0 | 7/27/05 | 7/29/05 |
| Surrogate: N-Tricosane | 78.8 | 70-130 | % Rec | 1.0 | 7/27/05 | 7/29/05 |

Date: 02-Aug-05
WorkOrder: 0507355

ANALYTICAL REPORT

Client Sample ID: Travel Blank
Lab ID: 0507355-07A

Received: 7/20/05

Collected:

Test Name: Gasoline Components/Additives

Reference: LUFT/EPA 8260B Modified

| <u>Parameter</u> | <u>Result</u> | <u>Limit</u> | <u>Units</u> | <u>DF</u> | <u>Extracted</u> | <u>Analyzed</u> |
|-----------------------------------|---------------|--------------|--------------|-----------|------------------|-----------------|
| Methyl tert-butyl ether (MTBE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Tert-butyl alcohol (TBA) | ND | 10 | µg/L | 1.0 | | 7/22/05 |
| Di-isopropyl ether (DIPE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Ethyl tert-butyl ether (ETBE) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Benzene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Tert-amyl methyl ether (TAME) | ND | 1.0 | µg/L | 1.0 | | 7/22/05 |
| Toluene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Ethylbenzene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| m,p-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| o-Xylene | ND | 0.50 | µg/L | 1.0 | | 7/22/05 |
| Surrogate: 1,4-Dichlorobenzene-d4 | 98.4 | 80.8-139 | % Rec | 1.0 | | 7/22/05 |

Test Name: TPH as Gasoline

Reference: LUFT/EPA 8260B Modified

| <u>Parameter</u> | <u>Result</u> | <u>Limit</u> | <u>Units</u> | <u>DF</u> | <u>Extracted</u> | <u>Analyzed</u> |
|------------------|---------------|--------------|--------------|-----------|------------------|-----------------|
| TPHC Gasoline | ND | 50 | µg/L | 1.0 | | 7/22/05 |

North Coast Laboratories, Ltd.

Date: 02-Aug-05

QC SUMMARY REPORT

Method Blank

CLIENT: City of Arcata
Work Order: 0507355
Project: 000108100, Arcata Corp Yard

| Sample ID: | MB 072205 | Batch ID: | R36061 | Test Code: | 8260OXYW | Units: | µg/L | Analysis Date: | 7/22/05 5:09:00 AM | Prep Date: | | | | |
|--------------------------------|-----------|-----------|--------|------------|-----------------|-----------|-------------|----------------|--------------------|------------|-------------|------|----------|------|
| Client ID: | | | | Run ID: | ORGCMS3_050722B | | | SeqNo: | 519238 | | | | | |
| Analyte | | | | Result | Limit | SPK value | SPK Ref Val | % Rec | LowLimit | HighLimit | RPD Ref Val | %RPD | RPDLimit | Qual |
| Methyl tert-butyl ether (MTBE) | | ND | 1.0 | | | | | | | | | | | |
| Tert-butyl alcohol (TBA) | | ND | 10 | | | | | | | | | | | |
| Di-isopropyl ether (DIPE) | | ND | 1.0 | | | | | | | | | | | |
| Ethyl tert-butyl ether (ETBE) | | ND | 1.0 | | | | | | | | | | | |
| Benzene | | ND | 0.50 | | | | | | | | | | | |
| Tert-amyl methyl ether (TAME) | | ND | 1.0 | | | | | | | | | | | |
| Toluene | | ND | 0.50 | | | | | | | | | | | |
| Ethylbenzene | | 0.09846 | 0.50 | | | | | | | | | | | J |
| m,p-Xylene | | 0.1881 | 0.50 | | | | | | | | | | | J |
| o-Xylene | | ND | 0.50 | | | | | | | | | | | |
| 1,4-Dichlorobenzene-d4 | | 0.986 | 0.10 | 1.00 | 0 | 98.6% | 81 | 81 | 139 | 139 | 0 | | | |
| Sample ID: | MB 072205 | Batch ID: | R36057 | Test Code: | GASW-MS | Units: | µg/L | Analysis Date: | 7/22/05 5:09:00 AM | Prep Date: | | | | |
| Client ID: | | | | Run ID: | ORGCMS3_050722A | | | SeqNo: | 519218 | | | | | |
| Analyte | | | | Result | Limit | SPK value | SPK Ref Val | % Rec | LowLimit | HighLimit | RPD Ref Val | %RPD | RPDLimit | Qual |
| TPHC Gasoline | | 22.85 | 50 | | | | | | | | | | | J |
| Sample ID: | MB-13905 | Batch ID: | 13905 | Test Code: | SGTPHDW | Units: | µg/L | Analysis Date: | 7/29/05 5:20:16 PM | Prep Date: | | | | |
| Client ID: | | | | Run ID: | ORGCS_050729A | | | SeqNo: | 519868 | | | | | |
| Analyte | | | | Result | Limit | SPK value | SPK Ref Val | % Rec | LowLimit | HighLimit | RPD Ref Val | %RPD | RPDLimit | Qual |
| TPHC Diesel (C12-C22) | | ND | 50 | | | | | | | | | | | |
| N-Tricosane | | 49.8 | 0.10 | 50.0 | 0 | 99.5% | 70 | 70 | 130 | 130 | 0 | | | |

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

B - Analyte detected in the associated Method Blank

QC SUMMARY REPORT

Method Blank

CLIENT: City of Arcata
Work Order: 0507355
Project: 000108100, Arcata Corp Yard

| Sample ID: | MB-13872 | Batch ID: | 13872 | Test Code: | TPHDW | Units: | µg/L | Analysis Date: | 7/22/05 3:10:19 PM | Prep Date: | 7/22/05 |
|-----------------------|----------|-----------|----------------|-------------|-------|----------|-----------|----------------|--------------------|------------|---------|
| Client ID: | | Run ID: | ORG C7_050722A | SeqNo: | | | | SeqNo: | 518577 | | |
| Analyte | Result | Limit | SPK value | SPK Ref Val | % Rec | LowLimit | HighLimit | RPD Ref Val | % RPD | RPD Limit | Qual |
| TPHC Diesel (C12-C22) | ND | 50 | 50.0 | 0 | 85.0% | 70 | 130 | 0 | 0 | | |
| N-Tricosane | 42.5 | 0.10 | | | | | | | | | |

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limits

B - Analyte detected in the associated Method Blank

R - RPD outside accepted recovery limits

North Coast Laboratories, Ltd.

Date: 02-Aug-05

CLIENT: City of Arcata
Work Order: 0507355
Project: 000108100, Arcata Corp Yard

QC SUMMARY REPORT

Laboratory Control Spike

| Sample ID: LCS-05470 | | Batch ID: R36061 | | Test Code: 8260OXYW | | Units: µg/L | | Analysis Date: 7/22/05 1:45:00 AM | | Prep Date: | | |
|-----------------------|--------------------------------|------------------|-------|---------------------|-------------|-------------|----------|-----------------------------------|-------------|------------|-----------|------|
| Client ID: | Analyte | Result | Limit | SPK value | SPK Ref Val | % Rec | LowLimit | HighLimit | RPD Ref Val | % RPD | RPD Limit | Qual |
| | Methyl tert-butyl ether (MTBE) | 20.55 | 1.0 | 20.0 | 0 | 103% | 80 | 120 | 0 | 0 | 0 | |
| | Tert-butyl alcohol (TBA) | 383.4 | 10 | 400 | 0 | 95.8% | 25 | 162 | 0 | 0 | 0 | |
| | Di-isopropyl ether (DIPE) | 21.05 | 1.0 | 20.0 | 0 | 105% | 80 | 120 | 0 | 0 | 0 | |
| | Ethyl tert-butyl ether (ETBEE) | 20.64 | 1.0 | 20.0 | 0 | 103% | 77 | 120 | 0 | 0 | 0 | |
| | Benzene | 21.85 | 0.50 | 20.0 | 0 | 109% | 78 | 117 | 0 | 0 | 0 | |
| | Tert-amy1 methyl ether (TAME) | 19.99 | 1.0 | 20.0 | 0 | 99.9% | 64 | 136 | 0 | 0 | 0 | |
| | Toluene | 19.79 | 0.50 | 20.0 | 0 | 98.9% | 80 | 120 | 0 | 0 | 0 | |
| | Ethylbenzene | 19.25 | 0.50 | 20.0 | 0 | 96.3% | 80 | 120 | 0 | 0 | 0 | |
| | m,p-Xylene | 38.96 | 0.50 | 40.0 | 0 | 97.4% | 80 | 120 | 0 | 0 | 0 | |
| | o-Xylene | 18.50 | 0.50 | 20.0 | 0 | 92.5% | 80 | 120 | 0 | 0 | 0 | |
| | 1,4-Dichlorobenzene-d4 | 1.07 | 0.10 | 1.00 | 0 | 107% | 81 | 139 | 0 | 0 | 0 | |
| Sample ID: LCSD-05470 | | Batch ID: R36061 | | Test Code: 8260OXYW | | Units: µg/L | | Analysis Date: 7/22/05 2:10:00 AM | | Prep Date: | | |
| Client ID: | Analyte | Result | Limit | SPK value | SPK Ref Val | % Rec | LowLimit | HighLimit | RPD Ref Val | % RPD | RPD Limit | Qual |
| | Methyl tert-butyl ether (MTBE) | 20.72 | 1.0 | 20.0 | 0 | 104% | 80 | 120 | 20.6 | 0.821% | 20 | |
| | Tert-butyl alcohol (TBA) | 393.0 | 10 | 400 | 0 | 98.3% | 25 | 162 | 38.3 | 2.48% | 20 | |
| | Di-isopropyl ether (DIPE) | 20.80 | 1.0 | 20.0 | 0 | 104% | 80 | 120 | 21.0 | 1.20% | 20 | |
| | Ethyl tert-butyl ether (ETBEE) | 20.71 | 1.0 | 20.0 | 0 | 104% | 77 | 120 | 20.6 | 0.334% | 20 | |
| | Benzene | 21.66 | 0.50 | 20.0 | 0 | 108% | 78 | 117 | 21.8 | 0.889% | 20 | |
| | Tert-amy1 methyl ether (TAME) | 20.17 | 1.0 | 20.0 | 0 | 101% | 64 | 136 | 20.0 | 0.895% | 20 | |
| | Toluene | 19.87 | 0.50 | 20.0 | 0 | 99.4% | 80 | 120 | 19.8 | 0.411% | 20 | |
| | Ethylbenzene | 19.23 | 0.50 | 20.0 | 0 | 96.1% | 80 | 120 | 19.2 | 0.126% | 20 | |
| | m,p-Xylene | 39.20 | 0.50 | 40.0 | 0 | 98.0% | 80 | 120 | 39.0 | 0.630% | 20 | |
| | o-Xylene | 18.24 | 0.50 | 20.0 | 0 | 91.2% | 80 | 120 | 18.5 | 1.43% | 20 | |
| | 1,4-Dichlorobenzene-d4 | 1.08 | 0.10 | 1.00 | 0 | 108% | 81 | 139 | 1.07 | 0.405% | 20 | |

Qualifiers:

NID - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

B - Analyte detected in the associated Method Blank

CLIENT: City of Arcata
Work Order: 0507355
Project: 000108100, Arcata Corp Yard

QC SUMMARY REPORT
Laboratory Control Spike

| Sample ID: | LCS-05471 | Batch ID: | R36057 | Test Code: | GASW-MS | Units: | µg/L | Analysis Date: 7/22/05 3:27:00 AM | | | Prep Date: | |
|-----------------------|-----------|-----------|------------------|------------|-------------|--------|----------|-----------------------------------|-------------|--------|------------|------|
| Client ID: | | Run ID: | ORGCMSS3_050722A | SeqNo: | 519215 | | | | | | | |
| Analyte | | Result | Limit | SPK value | SPK Ref Val | % Rec | LowLimit | HighLimit | RPD Ref Val | %RPD | RPDLimit | Qual |
| TPHC Gasoline | | 950.3 | 50 | 1,000 | 0 | 95.0% | 80 | 120 | 0 | | | |
| Sample ID: | LCS-05471 | Batch ID: | R36057 | Test Code: | GASW-MS | Units: | µg/L | Analysis Date: 7/22/05 3:52:00 AM | | | Prep Date: | |
| Client ID: | | Run ID: | ORGCMSS3_050722A | SeqNo: | 519216 | | | | | | | |
| Analyte | | Result | Limit | SPK value | SPK Ref Val | % Rec | LowLimit | HighLimit | RPD Ref Val | %RPD | RPDLimit | Qual |
| TPHC Gasoline | | 954.0 | 50 | 1,000 | 0 | 95.4% | 80 | 120 | 950 | 0.385% | 20 | |
| Sample ID: | LCS-13905 | Batch ID: | 13905 | Test Code: | SGTPHDDW | Units: | µg/L | Analysis Date: 7/29/05 3:17:52 PM | | | Prep Date: | |
| Client ID: | | Run ID: | ORGCS5_050729A | SeqNo: | 519866 | | | | | | | |
| Analyte | | Result | Limit | SPK value | SPK Ref Val | % Rec | LowLimit | HighLimit | RPD Ref Val | %RPD | RPDLimit | Qual |
| TPHC Diesel (C12-C22) | | 398.6 | 50 | 500 | 0 | 79.7% | 40 | 107 | 0 | | | |
| N-Tricosane | | 45.5 | 0.10 | 50.0 | 0 | 91.0% | 70 | 130 | 0 | | | |
| Sample ID: | LCS-13905 | Batch ID: | 13905 | Test Code: | SGTPHDDW | Units: | µg/L | Analysis Date: 7/29/05 3:47:58 PM | | | Prep Date: | |
| Client ID: | | Run ID: | ORGCS5_050729A | SeqNo: | 519867 | | | | | | | |
| Analyte | | Result | Limit | SPK value | SPK Ref Val | % Rec | LowLimit | HighLimit | RPD Ref Val | %RPD | RPDLimit | Qual |
| TPHC Diesel (C12-C22) | | 4118.8 | 50 | 500 | 0 | 83.8% | 40 | 107 | 399 | 4.96% | 15 | |
| N-Tricosane | | 48.4 | 0.10 | 50.0 | 0 | 96.8% | 70 | 130 | 45.5 | 6.19% | 15 | |
| Sample ID: | LCS-13872 | Batch ID: | 13872 | Test Code: | TPHDW | Units: | µg/L | Analysis Date: 7/22/05 1:29:01 PM | | | Prep Date: | |
| Client ID: | | Run ID: | ORGCT_050722A | SeqNo: | 518574 | | | | | | | |
| Analyte | | Result | Limit | SPK value | SPK Ref Val | % Rec | LowLimit | HighLimit | RPD Ref Val | %RPD | RPDLimit | Qual |
| TPHC Diesel (C12-C22) | | 546.5 | 50 | 500 | 0 | 109% | 67 | 120 | 0 | | | |
| N-Tricosane | | 50.0 | 0.10 | 50.0 | 0 | 100% | 70 | 130 | 0 | | | |

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

QC SUMMARY REPORT
Laboratory Control Spike Duplicate

CLIENT: City of Arcata
Work Order: 0507355
Project: 000108100, Arcata Corp Yard

| Sample ID: LCSD-13872 | Batch ID: 13872 | Test Code: TPHDIW | Units: µg/L | Analysis Date: 7/22/05 1:49:23 PM | | | | Prep Date: 7/22/05 | | | |
|-----------------------|-----------------|-----------------------|-------------|-----------------------------------|-------|----------|-----------|--------------------|--------|-----------|------|
| Client ID: | | Run ID: ORGC7_050722A | | SeqNo: 518575 | | | | | | | |
| Analyte | Result | Limit | SPK value | SPK Ref Val | % Rec | LowLimit | HighLimit | RPD Ref Val | % RPD | RPD Limit | Qual |
| TPHC Diesel (C12-C22) | 543.8 | 50 | 500 | 0 | 109% | 67 | 120 | 54.6 | 0.494% | 15 | |
| N-Tricosane | 48.4 | 0.10 | 50.0 | 0 | 96.7% | 70 | 130 | 50.0 | 3.36% | 15 | |

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
R - RPD outside accepted recovery limits

S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits

B - Analyte detected in the associated Method Blank

